

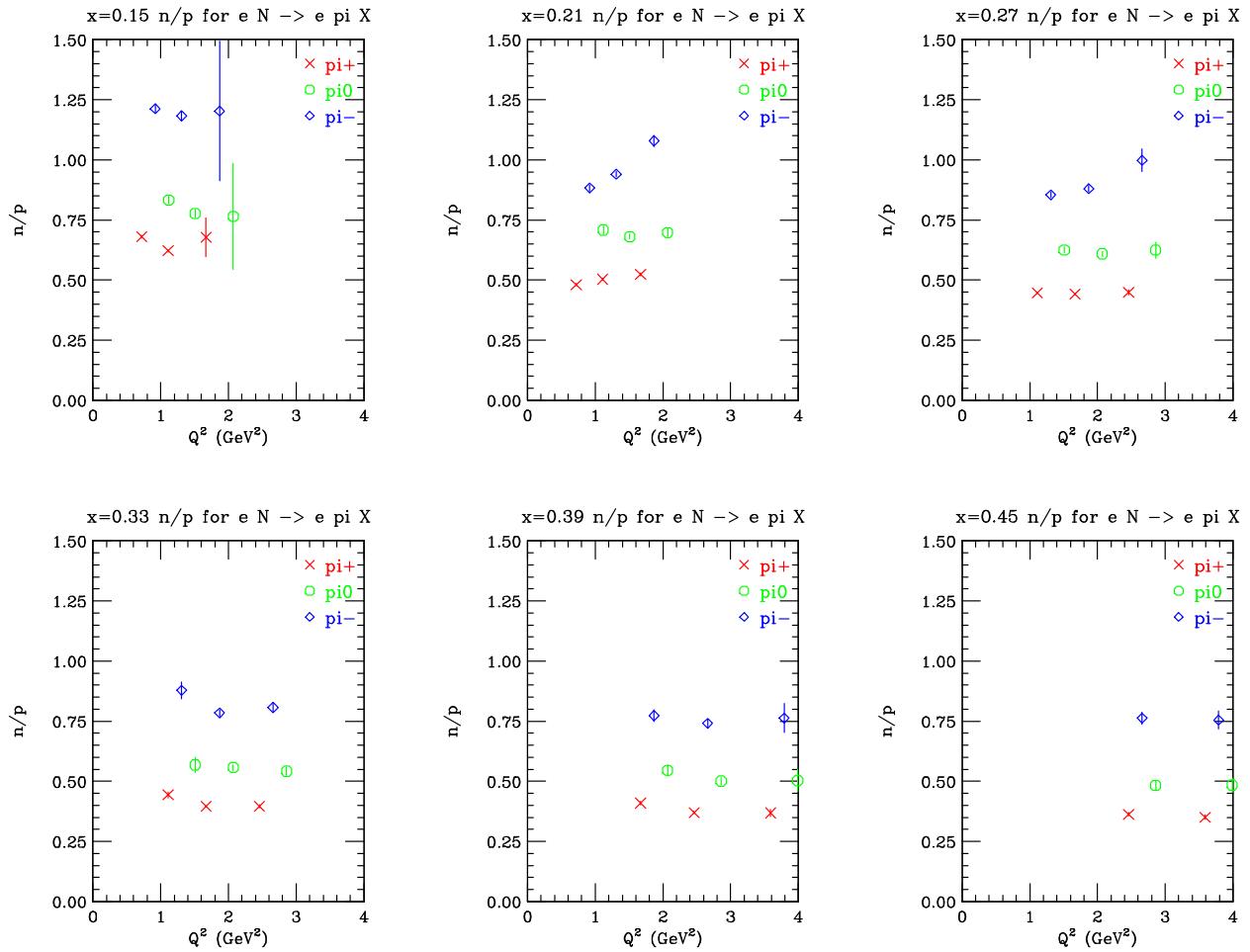
n/p for SIDIS
P. Bosted March 11, 2005

- SIDIS in LO QCD is given by product of quark PDFs and fragmentation function
- Flavor of hadron can enhance d or u quarks.
- Specifically, π^- much more sensitive to $d(x)$ than π^+ , so SIDIS on neutron good way to determine $d(x)$ at high x .
- Practical importance: ongoing study of polarized SIDIS measures SIDIS asymmetries for π^- and π^+ .
- To extract $\Delta u(x)$ and $\Delta d(x)$ using Strickman-Cristova-Leader method, need asymmetry for $\pi^+ - \pi^-$ on both proton and neutron.
- To cancel out acceptance effects, therefore need to know SIDIS cross sections for both proton and neutron on both π^- and π^+

ASSUMPTIONS

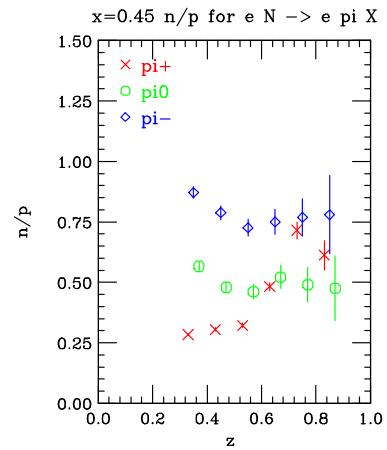
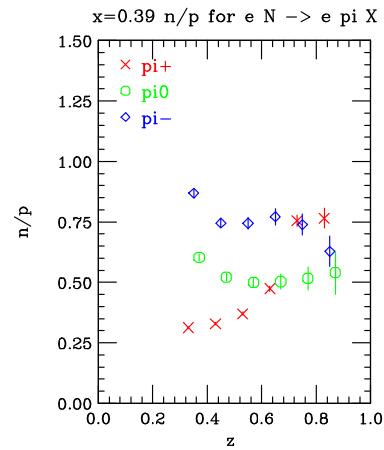
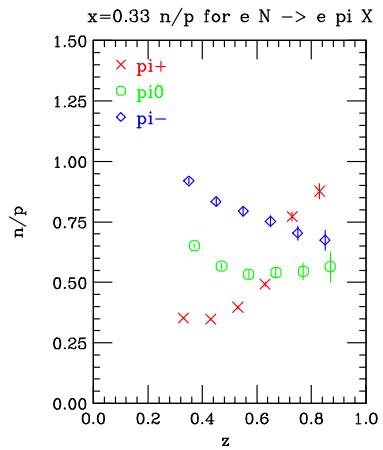
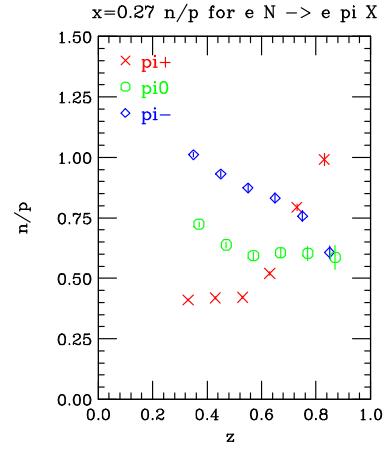
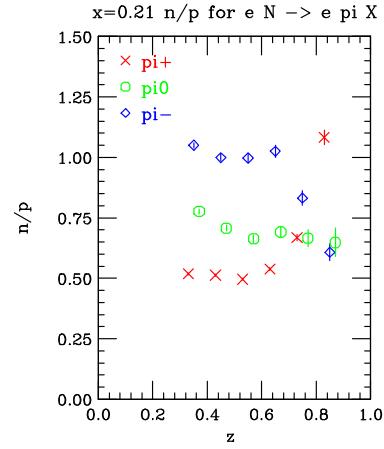
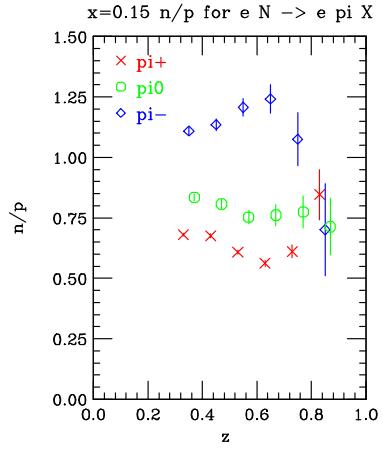
- Same acceptance as Eg1b inbending at 5.7 GeV
- n/p ratios follow LEPTO Monte Carlo
- Luminosity 10% of all Eg1b 5.7 GeV inbending data
- 20% of time is on pure proton target to cancel out acceptance
- 20% of neutron events are tagged by spectator proton.

PROJECTED ERRORS versus Q^2



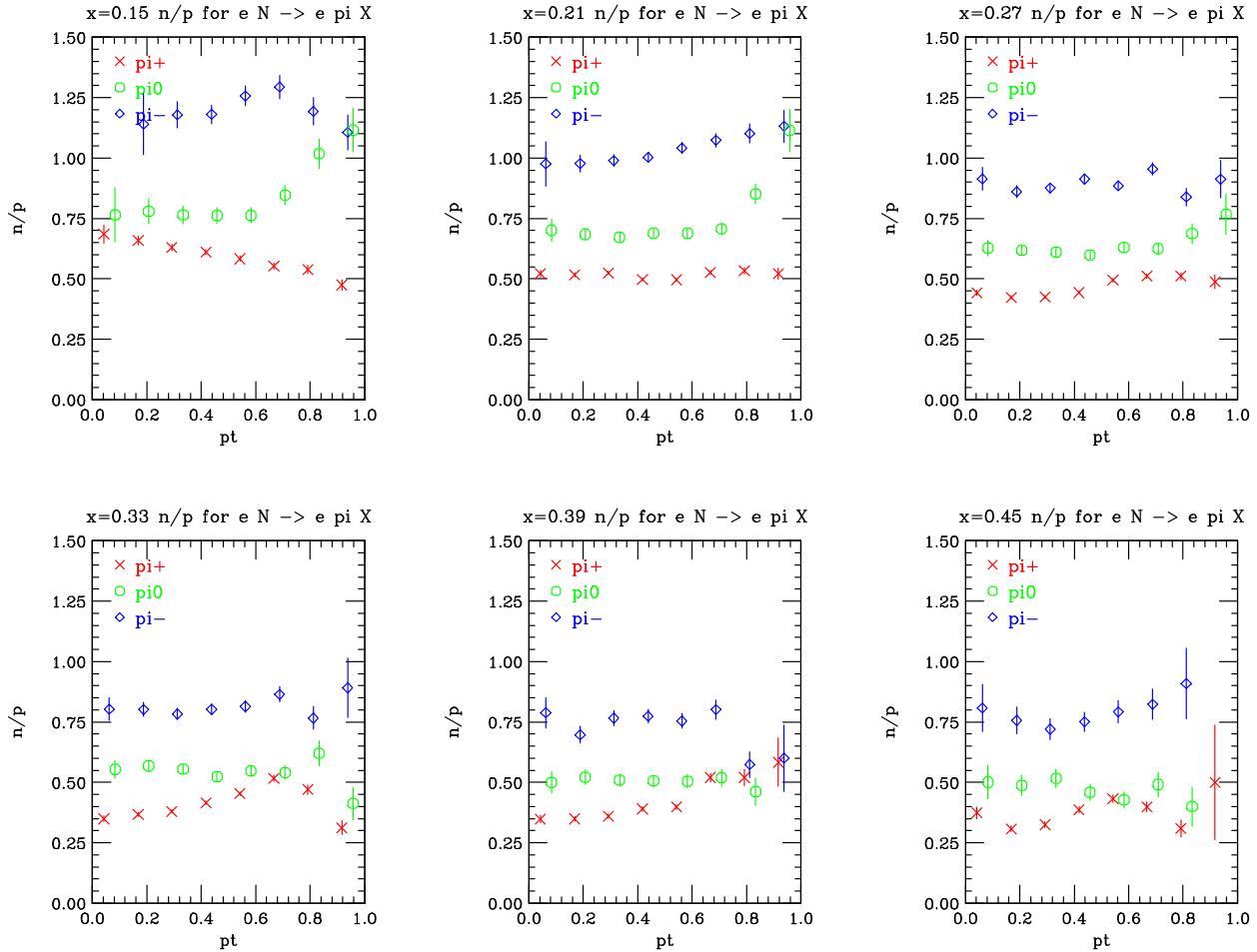
- used cuts $W > 2$ GeV, $W' > 1.1$ GeV, $0.4 < z < 0.7$, $p_t < 1$ GeV.

PROJECTED ERRORS versus z



- used cuts $W > 2$ GeV, $W' > 1.1$ GeV, $Q^2 > 1.1$ GeV 2 $p_t < 1$ GeV.

PROJECTED ERRORS versus p_t

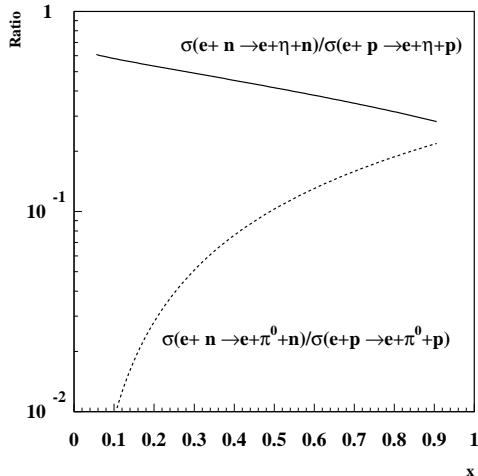


- used cuts $W > 2$ GeV, $W' > 1.1$ GeV, $0.4 < z < 0.7$, $Q^2 > 1.1$ GeV 2 .

CONCLUSIONS on SIDIS

- Errors on n/p for SIDIS are interestingly small for π^+ , π^0 , π^- for x up to 0.5 or 0.6
- Can also look at kaons and antiprotons up to $x = 0.4$ or so, for $p < 1.6$ GeV.
- Basically checks nuclear corrections for experiments using difference of deuteron and proton (Will Brooks *et al.* in Hall B, Meson Duality experiment in Hall C, planned experiment in Hall A.)

Hard Exclusive π^0 AND η Electroproduction



- “rigorous” QCD predictions for large Q^2 , W , and longitudinal photons.
- Prediction is strong suppression of π^0 from neutron (see hep-ph/9809277).
- Are rates big enough?
- How big is transverse. Is ϵ range big enough for a separation with 4.x and 5.x GeV?